

Trace Metal Retention in Urban Stormwater Ponds in the Lower Fraser Valley, B.C.

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Urbanization in the Lower Fraser Valley has resulted in many natural areas being replaced with housing, commercial developments and the transportation needed to support these changes. As impervious surfaces replace natural cover, the changes in the hydrologic system increase stormwater runoff, as infiltration is impeded and water is channelled out of the city to receiving waters. The quality of the water is compromised, as contaminants associated with urban land uses, such as trace metals, nutrients and pathogens are found in elevated concentrations in urban waterways (Field et al 2000; Ferguson 1990; Yuan et al 2001).

This research investigates the quality of the stormwater entering five innovative ponds in urban areas in the Lower Fraser Valley, B.C. and the effectiveness of trace metal retention. The study was conducted over a one-year period and water and sediment samples were taken every three to six weeks. Both water and sediment from the inlets and outlets were analysed. A new technique of Diffusive Gradient in Thin Films (DGT) was used to determine the accumulation of bioavailable metals over time, including storm events (Zhang 2003). The DGT units were deployed at the inlet and outlet of each pond for consecutive three-week periods.

The results show that an average of 26% (range 0% to 60%) of the samples of inlet water from the ponds exceeded the guideline for zinc of the Canadian Environmental Quality Guidelines for freshwater aquatic life. Copper and zinc concentrations of the inlet sediment of all ponds exceeded the Probable Effects Level. Zinc concentrations are reduced through the ponds by up to 41% in the water, 78% in bioavailability and 65% in the sediments. The extent of vegetation in the ponds had the strongest overall correlation to contaminant reduction in water, sediment and bioavailability.

Selected References

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